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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	
First Inventor	
Title	
Express Mail Label No.	EK948733340US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. ☒ Applicant claims small entity status. See 37 CFR 1.27.
3. ☒ Specification [*Total Pages* 23] (preferred arrangement set forth below)
   - Descriptive title of the invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings (*if filed*)
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. ☐ Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 0]
5. Oath or Declaration [*Total Pages* 2]
   a. ☒ Newly executed (original or copy)
   b. ☐ Copy from a prior application (37 CFR 1.63 (d)) *(for continuation/divisional with Box 17 completed)*
      i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1 33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76
7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (*Appendix*)
8. Nucleotide and/or Amino Acid Sequence Submission (*if applicable, all necessary*)
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ paper
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ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement *(when there is an assignee)* ☐ Power of Attorney
11. ☐ English Translation Document (*if applicable*)
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☐ Other: ....

17. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. ________ / ________

Prior application information: *Examiner* ________ *Group / Art Unit:* ________

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

18. CORRESPONDENCE ADDRESS

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Signature	Gordon Wayne Dyer	Date	9/25/00

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Application Elements

1. __*__ Fee Transmittal Form
2. __*__ Specification; total pages (23)
3. ____ Drawing(s); total sheets ( )
4. __*__ Oath; total pages (2)
5. ____ Microfiche Computer Program
6. ____ Nucleotide and/or Amino Acid Sequence Submission
7. __*__ Information Disclosure Statement

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STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR	Docket Number (Optional)

Applicant, Patentee, or Identifier: Gordon Wayne Dyer

Application or Patent No.: ______

Filed or Issued: 9/25/00

Title: Optometrist/Inventor
"Optical composite and method of making same"

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- [x] the specification filed herewith with title as listed above.
- [ ] the application identified above.
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Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

Gordon W. Dyer		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Gordon W. Dyer		
Signature of inventor	Signature of inventor	Signature of inventor
9/25/00		
Date	Date	Date

Optical composite and method of making same

Optical composite and method of making same

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method for making a composite optical material. More particularly, the present invention provides a method for producing an optically correct composite for use in ophthalmic lens production, bulletproof glass, Plexiglas, windshields, and fiber optics.

2. Description of Related Art

Composite optical materials have been used for many years because of the benefits (optically, structurally, or both) compared to a optical material made from single, uniform substance. Various methods have been used to create composite optical materials ranging from simply gluing different optical materials together to ion sputtering, and vapor or chemical deposition.

In ophthalmic lens production chemical deposition and ion sputtering are used to apply coatings to ophthalmic lenses. Also in the ophthalmic lens industry, anti-reflective coatings are routinely applied by vapor deposition to all types of ophthalmic lenses.

Optical fibers consist of a silica fiber core, cladding, buffer coating, and sheath. The core is usually fused silica, 5-600 gmm or larger in diameter; the larger the core, the more light the

fiber can carry. Depending on the fiber and the application, plastic fibers and fibers with different kinds of glass and core diameters are available. These fibers include those that are optimized to carry near-IR, IR, or UV and visible radiation from traditional spectroscopic light sources as well as the intense high-power light from lasers.

The cladding, a thin layer of glass, plastic, or polymer coating with an index of refraction lower than the core, surrounds the core. The function of the cladding is to reflect light back into the core as it moves down the fiber. The buffer coating is a plastic or a polymer that protects the core and cladding from moisture, scratches, and other contamination while imparting additional strength to the fiber.

Claddings are usually silica, but other glasses, silicone, and other polymers may be used; however, the refractive index must be lower than the core to allow light to propagate through the fiber. Because polymer claddings can be removed with a suitable solvent, fibers with polymer-based claddings can be used for applications requiring the internal reflectance properties of the bare fiber in an application called evanescent wave spectroscopy. Such claddings are generally applied in expensive vacuum chambers using plasma-enhanced chemical deposition methods powered by either microwave or radio frequency energies.

As an enabling technology, fiber optics allows in situ, real-time or near-real-time measurements of dynamic systems in both chemical process streams and laboratories. Much of the work by vendors of probes has focused on the development and construction of fiber-optic

probes for near-IR and IR applications. The specifics of what people are actually doing with the technology are harder to come by because of trade secret issues. However, the applications reported in the literature and publicized by vendors or users appear to be the tip of the iceberg. In addition, vendor confidence and continued development of fiber-optic-based technologies for spectroscopy are indications that the chemical and chemical process communities are focusing on the technology. However, a shortcoming of the previous claddings, buffer coatings, and sheaths is the expense of their application.

Bulletproof glass, like all polycarbonate products, though strong is prone to optical aberrations. In addition, it is soft and thus must be bonded to another optical material to prevent it from scratching. Its optical clarity is reduced even further when it is laminated to the usual one or more sheets of glass. Also, polycarbonate's low Abbe' number makes light dispersion an inherent problem. A related laminated product, windshields, suffers from the same optical limitation. In lamination, the poor optical nature of the interlayer always reduces the final product's optical clarity. Thus, a shortcoming of windshields are that they have poor optical clarity. Because this reduction in optical clarity is accentuated by curvature, another shortcoming of the lamination process is that it limits the resulting bulletproof glass and windshield composites to relatively flat shapes. Further, a shortcoming of the polycarbonate ophthalmic lens industry is that polycarbonate lenses while light, strong and ultraviolet protective, scratch relatively easily, are prone to chemical damage from cleaners, and have relatively poor

optics.

What is needed therefore is a way to provide claddings and buffer coatings more cheaply. It would also be desirable to make polycarbonate products such as bullet-proof glass and ophthalmic lenses more scratch resistant, have better optical quality, and even be photochromic by bonding it to the finest optical material known, glass. And, finally, it would also be desirable to allow for curved windshields and to increase passenger safety by allowing the use of cheaper, high tensile strength multi-layered windshields.

SUMMARY

In accordance with the present invention, methods and a composition are provided for producing an optical composite with the optical clarity and scratch-resistance of a glass and the tensile strength of a polymer. In addition, the present invention also provides an optical composite with the optical clarity of a glass, yet protected by the tensile strength of a polymer.

The present invention includes a glass and polymer composite composed of a glass having a shape, a center, a margin; the plastic has a center, a shape adapted to receive the shape of the glass, and a margin; a sealant is disposed between the margin of the glass and the margin of the plastic, whereby the central portions of the glass and the plastic are devoid of the sealant.

The present invention includes having the glass contain metallic compounds selected

from the group consisting of silver salts, copper salts gold, palladium, cadmium chalcogenides, noble metal colloids, and ferrites.

The present invention also includes having the glass be photochromic.

The present invention also includes having the plastic, in whole or in part, be selected from the group consisting of polycarbonate, polyurethane, polystyrene, fluorocarbon and polymethylmethacrylate.

The present invention also includes having the sealant be selected from the group consisting of silicones, shellac and lacquer, silane coupling agents, disilyl crosslinker compounds, epoxy resins, crosslinkable polyethylene vinylacetate terpolymer, polyvinyl butyral and polysulfide.

The present invention also includes having the glass and plastic be transparent and refractive.

The present invention also includes having the margin of the glass having at least one appendage and the margin of the plastic defining an aperture shaped for receiving the appendage of the glass.

The present invention also includes having the margin of the plastic having at least one appendage and the margin of the plastic defining an aperture shaped for receiving the appendage of the plastic.

The present invention also includes having the percentage of glass in the composite

be between about 0.01 to 99.99 %.

The present invention also includes having a microwave-transparent spring-loaded vice adapted to hold together the glass and the plastic.

The present invention also includes having a vice whose spring tension is between about 0.01 to 200 foot pounds.

The present invention also includes having a weighted microwave-transparent, vice adapted to hold together the glass and the plastic.

The present invention also includes having a vice whose holding weight is between about 0.01 to 100 pounds.

The present invention also includes a method of forming a glass and plastic composite by forming a glass having a margin and a center to a particular shape; then forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass; then applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant; then placing together the glass and the plastic; then placing the glass and plastic into a vacuum chamber; then applying vacuum pressure to the glass and the plastic; then placing the vacuum chamber into a microwave oven; and then finally, applying microwave radiation to the glass and the plastic for an effective time.

The present invention also includes a method of forming a glass and plastic composite using an applied vacuum pressure of between about 0.01 to 200 torr.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation applied at between about 10 watts to 100,000 watts and a frequency of between about 3kHz to 300 Ghz.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation that is applied for between about 0.01 to 100 minutes.

The present invention also includes a method of forming a glass and plastic composite by forming a glass having a center and a margin to a particular shape; then forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass; then applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant; then applying force to the glass and plastic by placing the glass and plastic into a microwave-transparent vice adapted to hold together the glass and plastic; then placing the glass the plastic into a vacuum chamber; then applying vacuum pressure to the glass and the plastic; then placing the vacuum chamber into a microwave oven; and then finally, applying microwave radiation to the glass and the plastic for an effective time.

The present invention also includes a method of forming a glass and plastic composite using vacuum pressure that is applied for between about 0.01 to 200 torr.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation that is applied for between about 0.01 to 100 minutes.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation wherein the microwave radiation is applied at between about 10 to 100,000 watts and at a frequency of between about 3kHz to 300 Ghz.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation where sealant is applied to the glass and the plastic before the glass and the plastic are placed together and an effective amount of distilled water is applied to the center of the glass and the center of the plastic before applying the microwave radiation.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic before the glass and the plastic are placed together, that uses gravity to hold the glass and the plastic together.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic before the glass and the plastic are placed together, that uses spring tension to hold the glass and the plastic together. .

The present invention also includes a method of forming a glass and plastic composite by forming a glass having a center and a margin to particular shape; then forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass; then applying force to the glass and plastic by placing the glass and plastic into a microwave-transparent vice adapted to hold together the shape of the glass and the shape of the plastic; then placing the glass and plastic into a vacuum chamber; then applying vacuum pressure to the glass and the

plastic; then placing the vacuum chamber into a microwave oven; then applying microwave radiation to the glass and the plastic; then applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant; and finally, applying microwave radiation to the glass and the plastic for an effective time.

The present invention also includes a method of forming a glass and plastic composite, that uses gravity to hold the glass and the plastic together, where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and before applying microwave radiation to the glass and the plastic.

The present invention also includes a method of forming a glass and plastic composite, that uses spring tension to hold the glass and the plastic together, where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and before applying microwave radiation to the glass and the plastic.

The present invention also includes a method of forming a glass and plastic composite using microwave radiation where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and an effective amount of distilled water is applied to the center of the glass and the center of the plastic before applying the microwave radiation.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic after the glass and the plastic are placed

together and before applying microwave radiation to the glass and the plastic, where vacuum pressure is applied for between about 0.01 to 200 torr.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and before applying microwave radiation to the glass and the plastic, where the microwave radiation is applied for between about 0.01 to 100 minutes.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and before applying microwave radiation to the glass and the plastic, where the microwave radiation is applied for between about 10 to 100,000 watts and a frequency of between about 3kHz to 300 Ghz.

The present invention also includes a method of forming a glass and plastic composite, where sealant is applied to the glass and the plastic after the glass and the plastic are placed together and before applying microwave radiation to the glass and the plastic, where the microwave radiation is applied for between about 0.01 minutes to 100 minutes.

The present invention also includes a glass and plastic composite formed by joining a glass having a margin and a center and a particular shape to a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass; then applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and

the center of the plastic are devoid of the sealant; then placing together the glass and the plastic; then placing the glass and plastic into a vacuum chamber; then applying vacuum pressure to the glass and the plastic; then placing the vacuum chamber into a microwave oven; and then finally, applying microwave radiation to the glass and the plastic for an effective time.

It is a characteristic of the present invention to provide a method of bonding together glass and plastic, while maintaining their original optical clarity.

It is a characteristic of the present invention to provide method to prevent plastic from becoming scratched by protecting it with a layer of glass.

It is a characteristic of the present invention to provide a method to prevent glass from becoming damaged by protecting it with a layer of plastic.

It is a characteristic of the present invention to provide a method to provide glass-like optical characteristics to plastic by bonding the plastic to a rigid glass surface.

It is a characteristic of the present invention to provide method of making a glass and plastic composite that is photochromic and capable of being performed by optical labs of diverse size.

It is a characteristic of the present invention to provide a method of differentially heating the glass and the plastic during the bonding process of forming the resultant optical composite.

DETAILED DESCRIPTION OF THE INVENTION

The description of the present invention is organized as follows: a general description, including a description of operation of one embodiment is described, then alternative embodiments are described.

The optical composite is composed of at least one piece of glass and one piece of plastic. The glass is a microwave absorbent glass. The plastic is heated indirectly by heat transmitted to it by the adjacent microwave-heated the glass portion. The glass and plastic's margins are then sealed together with a sealant.

Glass means an amorphous, vitreous substance that has a disordered molecular arrangement, but is mechanically rigid and capable of transmitting light.

The glass can include silver salts, copper salts gold, palladium, cadmium chalcogenides, noble metal colloids, and ferrites.

The plastic can include, in whole or in part, polycarbonates, polyurethanes, polystyrenes, fluorocarbons and polymethylmethacrylates.

The sealant can include, in whole or in part, silicones, shellac, lacquer, epoxy, silane coupling agents, disilyl crosslinker compounds, epoxy resins, crosslinkable polyethylene vinylacetate terpolymer, polyvinyl butyral, polysulfide, and commercially available, crosslinkable polyethylene vinylacetate terpolymer.

The most preferred silane coupling agents are those which are commercially available

and which are recognized by those skilled in the art as being effective coupling agents. In particular, silane coupling agents include N-(2-aminoethyl)-3-aminopropyltrimethoxysilane, 3[2(vinylbenzylamino) ethylamino]propyltrimethoxysilane, 3-methacryloxypropyltrimethoxysilane, 3- glycidoxypropyltrimethoxysilane, triacetoxyvinylsilane, tris-(2-methoxyethoxy) vinylsilane, 3-chloropropyltrimethoxysilane, 3-aminopropyltrimethoxysilane, vinyltrimethoxysilane, mercaptopropyltrimethoxysilane, mercaptopropyltriethoxysilane and the azide functional silanes of the formula $X_3 SiR'''SO_2N_3$, where X denotes a hydrolyzable group such as an alkoxy, an alkylalkoxy or a chloro radical, and R''' denotes a divalent organic radical.

The syntheses of the disilyl crosslinker compounds are known in the art. The disilylalkyl compounds can be synthesized by reacting choloralkytrialkoxysilane with tetraalkoxysilane (represented by the formula SiX_4 where X is an alkoxy group) in the presence of lithium. The bis(trimethoxysilyl)benzene compounds can be synthesized by reducing bis(trichlorosilyl)benzene with lithium aluminum halide followed by methanolysis as described in Preparation and Characterization of Disilylbenzene and Bis(trimethoxysilyl)benzene, Bilow, et al., J. Org. Chem. 26(3) 929, 1961. The disilyl crosslinker can also be synthesized by any of the means taught in U.S. Pat. No. 3,179,612, especially, by the method taught in Example 2 of said patent. The disilyl crosslinker compounds can also be synthesized by reacting polyamines with chloroalkylsilanes according to the method taught in U.S. Pat. No.4,448,694.

In a preferred embodiment, the glass contains silver salts, copper salts gold, palladium, cadmium chalcogenides, noble metal colloids, and ferrites. The glass and the plastic are placed in a vacuum while microwave radiation is applied to the resulting optical composite. After removal from the microwave radiation, and while still held in a microwave-transparent vice, a sealant is applied to the margins of the glass and the plastic at their junction. The glass and plastic may each be refractive. The glass percentage of the composite is between about 0.01% to 99.99%. The plastic percentage of the composite is between about 0.01% to 99.99%. The glass and plastic each range from being opaque to being transparent.

The vice can include conventional glasses, conventional plastics, and conventional natural and synthetic rubbers.

The microwave-transparent materials can include conventional glasses, conventional plastics, and conventional natural and synthetic rubbers.

Photochromic means a visible and reversible change in light transmission or color that is induced by exposure of the material to electromagnetic radiation.

Refractive means that the material is capable of bending a particular wavelength of light.

Opaque means not transmitting a particular wavelength of light.

Transparent means transmitting at least 99.99% of a particular wavelength of light.

Microwave-transparent means that not absorbing microwave radiation.

In another preferred embodiment, distilled water is placed between the glass

and the plastic before microwave radiation is applied.

In another preferred embodiment, the optic fiber is made up of 3 to 4 parts: a central core made of silicon dioxide glass, though other glasses may also be used, for transmitting the optical signals; surrounding the core is a cladding; a buffer coating in turn surrounds the cladding; and an optional final coat, the sheath surrounds the buffer.

Cladding means a thin layer of glass, plastic, or polymer coating with an index of refraction lower than the core, surrounding the core. The function of the cladding is to reflect light back into the core as it moves down the fiber. The cladding may be multi-layered. These cladding layers may be of different indices of refraction. Claddings are usually silica, but other glasses, silicone, and other polymers may be used; however, the refractive index must be lower than the core to allow light to propagate through the fiber.

The buffer coating is a plastic or a polymer that protects the core and cladding from moisture, scratches, and other contamination while imparting additional strength to the fiber.

The sheath is an optional final coating made of metal, plastic or a polymer and provides additional strength, stiffness, protection and resistance to moisture.

In one preferred embodiment, the core is made of glass and polymer cladding is bonded on to the optic fiber using heat generated from microwave radiation absorbed by the optic fiber.

In another preferred embodiment, the core is made of glass and a polymer sheath is bonded on to the optic fiber using heat generated from microwave radiation absorbed by

the optic fiber.

In another preferred embodiment, the core is made of glass and a buffer coating is bonded on to the optic fiber using heat generated from microwave radiation absorbed by the optic fiber.

While a few presently preferred embodiments of the invention are shown and described, it will be apparent to those skilled in the art that various changes and modifications, such as substituting ultraviolet radiation and ultraviolet absorbing compounds for the present invention's microwave radiation and microwave absorbing compounds, may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. An glass and plastic composite comprising:

a glass having a shape, a center, a margin;

a plastic having a shape essentially adapted to receive the shape of the glass, a center, a margin; and

a sealant disposed between the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant.

2. The composite of claim 1 wherein the glass contains a microwave absorbent compound selected from the group consisting of a metallic salt and a ferrite.

3. The composite of claim 2 wherein the glass is photochromic.

4. The composition of claim 1 wherein the plastic is selected from the group consisting of polycarbonate, polyurethane, polystyrene, fluorocarbon and polymethylmethacrylate.

5. The composition of claim 1 wherein the sealant is selected from the group consisting of silicones, shellac, lacquer, silane coupling agents, disilyl crosslinker compounds, epoxy resins, crosslinkable polyethylene vinylacetate terpolymer, polyvinyl butyral and polysulfide.

6. The composite of claim 1 wherein the glass and plastic are transparent and refractive.

7. The composite of claim 1 wherein the margin of the glass has at least one appendage and the margin of the plastic defines an aperture shaped for receiving the appendage of the glass.

8. The composite of claim 1 wherein the percentage of glass in the composite is between about 0.01 to 99.99%.

9. The composite of claim 1 wherein the percentage of plastic in the composite is between about 0.01 to 99.99%.

10. The composite of claim 1 wherein the margin of the plastic has at least one appendage and the margin of the glass defines an aperture shaped for receiving the appendage of the plastic.

11. A microwave-transparent spring-loaded vice adapted to hold together the glass and plastic of claim 1.

12. The vice of claim 11 wherein the spring tension is between about 0.01 to 200 foot pounds.

13. A microwave-transparent, weighed vice adapted to hold together the glass and plastic of claim 1.

14. The vice of claim 11 wherein the vice□s holding weight is between about 0.01 to 100 foot pounds.

15. A method of forming a glass and plastic composite comprising:

forming a glass having a margin and a center to a particular shape;

forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass;

applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant;

placing together the glass and the plastic;

placing the glass and plastic into a vacuum chamber;

applying vacuum pressure to the glass and the plastic;

placing the vacuum chamber into a microwave oven; and

applying microwave radiation to the glass and the plastic for an effective time.

16. The method of claim 15 wherein the applied vacuum pressure is between about 0.01 to 200 torr.

17. The method of claim 15 wherein the microwave radiation is applied at between about 10 watts to 100,000 watts and a frequency of about between 3kHz to 300 Ghz.

18. The method of claim 15 wherein the microwave radiation is applied for between about 0.01 to 100 minutes.

19. A method of forming a glass and plastic composite comprising:

forming a glass having a center and a margin to a particular shape;

forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass;

applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant;

applying force to the glass and plastic by placing the glass and plastic into a microwave-transparent vice adapted to hold together the glass and plastic;

placing the glass the plastic into a vacuum chamber;

applying vacuum pressure to the glass and the plastic;

placing the vacuum chamber into a microwave oven; and

applying microwave radiation to the glass and the plastic for an effective time.

20. The method of claim 19 wherein the vacuum pressure applied is between about 0.01 to 200 torr.

21. The method of claim 19 wherein the microwave radiation is applied for between about 0.01 to 100 minutes.

22. The method of claim 19 wherein the microwave radiation is applied at between about 10 to 100,000 watts and at a frequency of about between 3kHz to 300 Ghz.

23. The method of claim 19 wherein an effective amount of distilled water is applied to the center of the glass and the center of the plastic before applying the microwave radiation.

24. The method of claim 19 wherein the force of the vice is gravity.

25. The method of claim 19 wherein the force of the vice is spring tension.

26. A method of forming a glass and plastic composite comprising:

forming a glass having a center and a margin to particular shape;

forming a plastic having a margin and a center to a shape essentially adapted to receive the shape of the glass;

applying force to the glass and plastic by placing the glass and plastic into a microwave-transparent vice adapted to hold together the shape of the glass and the shape of the plastic;

placing the glass and plastic into a vacuum chamber;

applying vacuum pressure to the glass and the plastic;

placing the vacuum chamber into a microwave oven;

applying microwave radiation to the glass and the plastic;

applying sealant only to the margin of the glass and the margin of the plastic, whereby the center of the glass and the center of the plastic are devoid of the sealant; and

applying microwave radiation to the glass and the plastic for an effective time.

27. The method of claim 26 wherein the force of the vice is gravity.

28. The method of claim 26 wherein the force of the vice is spring tension.

29. The method of claim 26 wherein an effective amount of distilled water is applied to the center of the glass and the center of the plastic before placing the glass and plastic into the microwave-transparent vice.

30. The method of claim 26 wherein the vacuum pressure is applied for between about 0.01 to 200 torr.

31. The method of claim 26 wherein the microwave radiation is applied for between about

0.01 to 100 minutes.

32. The method of claim 26 wherein the microwave radiation is applied for between about 10 to 100,000 watts and a frequency of between about 3kHz to 300 Ghz.

33. The method of claim 26 wherein the microwave radiation is applied for between about 0.01 minutes to 100 minutes.

34. A glass and plastic composite made according to the method of claim 15.

ABSTRACT

A method for making an optical composite composed of glass and plastic is disclosed. The method can be used to create a photochromic lens of high optical and refractive quality that is both scratch resistant and of high impact resistance. The method can also be used to create a strong sheath and/or cladding for an optic fiber. The method can also be used to create a scratch resistant coating for polycarbonate material, such as bulletproof glass. Vacuum pressure and optical contacting are used to hold the glass and plastic portions together. A flexible, peripheral seal, whose kinetic reaction strength has been enhanced with microwave radiation, is used maintain the vacuum adhesion of the glass and the plastic. This structural seal is located in a peripheral, non-optical portion of the optical composite to minimize any interference the seal may have with the optical function of the composite.

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☒ Declaration Submitted with Initial Filing **OR** ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	/
First Named Inventor	Gordon W. Dyer
COMPLETE IF KNOWN	
Application Number	/
Filing Date	
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint invento r (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Optical composite and method of making same

the specification of which *(Title of the Invention)*

☒ is attached hereto
OR
☐ was filed on (MM/DD/YYYY) [ ] as United States Application Number or PCT International Application Number [ ] and was amended on (MM/DD/YYYY) [ ] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1 56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inven tor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's cer tificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

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Application Number(s)	Filing Date (MM/DD/YYYY)

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I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number *(if applicable)*

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As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: ☐ Customer Number [ ] → *Place Customer Number Bar Code Label here*
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
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☐ Additional inventors are being named on the ____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto